



## State of New Jersey

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*Governor*

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CATHERINE R. McCABE  
*Commissioner*

**August 3, 2020**

Jeremy Fink, P.E.  
Hydro International (Stormwater)  
94 Hutchins Drive  
Portland, ME 04102

Re: MTD Lab Certification  
StormScape Filter  
Off-line Installation

### **TSS Removal Rate 80%**

Dear Mr. Fink:

The Stormwater Management rules under N.J.A.C. 7:8-5.5(b) and 5.7(c) allow the use of manufactured treatment devices (MTDs) for compliance with the design and performance standards at N.J.A.C. 7:8-5 if the pollutant removal rates have been verified by the New Jersey Corporation for Advanced Technology (NJCAT) and have been certified by the New Jersey Department of Environmental Protection (NJDEP). Hydro International has requested a Laboratory Certification for the StormScape Filter (StormScape).

The project falls under the "Procedure for Obtaining Verification of a Stormwater Manufactured Treatment Device from New Jersey Corporation for Advance Technology" dated January 25, 2013. The applicable protocol is the "New Jersey Department of Environmental Protection Laboratory Protocol to Assess Total Suspended Solids Removal by a Filtration Manufactured Treatment Device" dated January 25, 2013.

NJCAT verification documents submitted to the NJDEP indicate that the requirements of the aforementioned protocol have been met or exceeded. The NJCAT letter also included a recommended certification TSS removal rate and the required maintenance plan. The NJCAT Verification Report with the Verification Appendix (dated June 2020) for this device is published online at <http://www.njcat.org/verification-process/technology-verification-database.html>.

**The NJDEP certifies the use of the StormScape stormwater treatment unit by Hydro International at a TSS removal rate of 80% when designed, operated, and maintained in accordance with the information provided in the Verification Appendix and the following conditions:**

1. The maximum treatment flow rate (MTFR) for the manufactured treatment device (MTD) is calculated using the New Jersey Water Quality Design Storm (1.25 inches in 2 hrs) in N.J.A.C. 7:8-5.5. The MTFR is calculated based on a verified loading rate of 1.46 gpm/ft<sup>2</sup> of effective filtration treatment area.
2. The StormScape stormwater treatment unit shall be installed using the same configuration reviewed by NJCAT, and sized in accordance with the criteria specified in item 7 below.
3. This device cannot be used in series with another MTD or a media filter (such as a sand filter) to achieve an enhanced removal rate for total suspended solids (TSS) removal under N.J.A.C. 7:8-5.5.
4. Additional design criteria for MTDs can be found in Chapter 9.6 of the New Jersey Stormwater Best Management Practices (NJ Stormwater BMP) Manual, which can be found online at [www.njstormwater.org](http://www.njstormwater.org).
5. The maintenance plan for a site using this device shall incorporate, at a minimum, the maintenance requirements for the StormScape. A copy of the maintenance plan is attached to this certification. However, it is recommended to review the maintenance website at [https://hydro-int.com/sites/default/files/stomscape\\_install\\_and\\_maintenance.pdf](https://hydro-int.com/sites/default/files/stomscape_install_and_maintenance.pdf) for any changes to the maintenance requirements.
6. For an MTD to be considered “green infrastructure” in accordance with the March 2, 2020 amendments to the Stormwater Management rules at N.J.A.C. 7:8, the MTD must meet the GI definition noted at amended N.J.A.C. 7:8-1.2. Specifically, the MTD shall (1) infiltrate into the subsoil; and/or (2) treat stormwater runoff through filtration by vegetation or soil.

The StormScape is a stormwater treatment system that filters polluted stormwater in a downward flow, horizontal media bed. Each StormScape consists of an array of surface pavers that protect a bed of engineered filtration media. There are two options of installation available for the StormScape. In the “underdrain” option, the system is installed directly in a rough excavation with no enclosing box or liner, but with an underdrain comprised of a perforated discharge pipe embedded in coarse stone. The discharge pipe is installed with an unperforated riser that acts as both a bypass and as an inspection port. This arrangement needs to meet the NJDEP Stormwater BMP Manual condition of having at least one foot of separation from the seasonal high water table measured from the bottom of the stone bed where the underdrain is set. In another arrangement, if surrounding soils allow for infiltration, the open structure of the system allows for installation as a “stand-alone” MTD that encourages stormwater infiltration and runoff volume reduction by maximizing contact with native soils. This arrangement needs to meet the NJDEP Stormwater BMP Manual conditions of having the most hydraulically restrictive soil layer below the MTD meet the minimum tested infiltration rate of one inch per hour, have at least two feet of separation from the seasonal high water table measured from the lowest point of the system, and infiltrate into the subsoil.

## 7. Sizing Requirement:

The example below demonstrates the sizing procedure for the StormScape:

Example: A 0.25-acre impervious site is to be treated to 80% TSS removal using StormScape. The impervious site runoff (Q) based on the New Jersey Water Quality Design Storm was determined to be 0.79 cfs or 354.58 gpm.

The selection of the appropriate model of StormScape is based upon both the maximum inflow drainage area and the MTFR. It is necessary to calculate the required model using both methods and to use the largest model determined by the two methods.

### Inflow Drainage Area Evaluation:

The drainage area to the StormScape in this example is 0.25 acres. Based upon the information in Table 1 below, the 4 x 12, 6 x 8, 6 x 10 and 6 x 12 StormScape models would be able to treat runoff without exceeding the maximum allowable drainage area.

### Maximum Treatment Flow Rate (MTFR) Evaluation:

The site runoff (Q) was based on the following:

time of concentration = 10 minutes

$i = 3.2$  in/hr (page 5-8, Fig. 5-3 of the NJ Stormwater BMP Manual)

$c = 0.99$  (runoff coefficient for impervious)

$Q = ciA = 0.99 \times 3.2 \times 0.25 = 0.79$  cfs (354.58 gpm)

(Note: 1 cfs = 448.83 gpm)

Given the site runoff is 0.79 cfs (354.58 gpm) and based on Table 1 below, it would require four 6 x 12 units to treat the impervious area without exceeding the MTFR. The units should be configured such that the flowrate to each unit does not exceed 105 gpm and the entire 0.25 acre area is treated.

Example: four 6 x 12 units at 105 gpm (MTFR) = 420 gpm

The MTFR evaluation results will be used since that method results in the highest minimum configuration determined by the two methods.

The sizing table corresponding to the available system models is noted below:

**Table 1. StormScape MTFRs and Maximum Allowable Drainage Area.**

<b>Filter Size (ft)</b>	<b>MTFR (gpm)</b>	<b>MTFR (cfs)</b>	<b>Maximum Allowable Drainage Area (ac)</b>
4 x 6	35	0.078	0.147
4.38 x 6.58	42	0.094	0.176
4 x 8	47	0.105	0.196
4 x 10	58	0.129	0.244
4 x 12	70	0.156	0.293
6 x 6	53	0.118	0.220
6 x 8	70	0.156	0.293
6 x 10	87	0.194	0.367
6 x 12	105	0.234	0.440

Be advised a detailed maintenance plan is mandatory for any project with a Stormwater BMP subject to the Stormwater Management Rules, N.J.A.C. 7:8. The plan must also include all of the items identified in N.J.A.C. 7:8-5.8. Such items include, but are not limited to, the list of inspection and maintenance equipment and tools, specific corrective and preventative maintenance tasks, indication of problems in the system, and training of maintenance personnel. Additional information can be found in Chapter 8: Maintenance and Retrofit of Stormwater Management Measures.

If you have any questions regarding the above information, please contact Brian Salvo of my office at (609) 633-7021.

Sincerely,



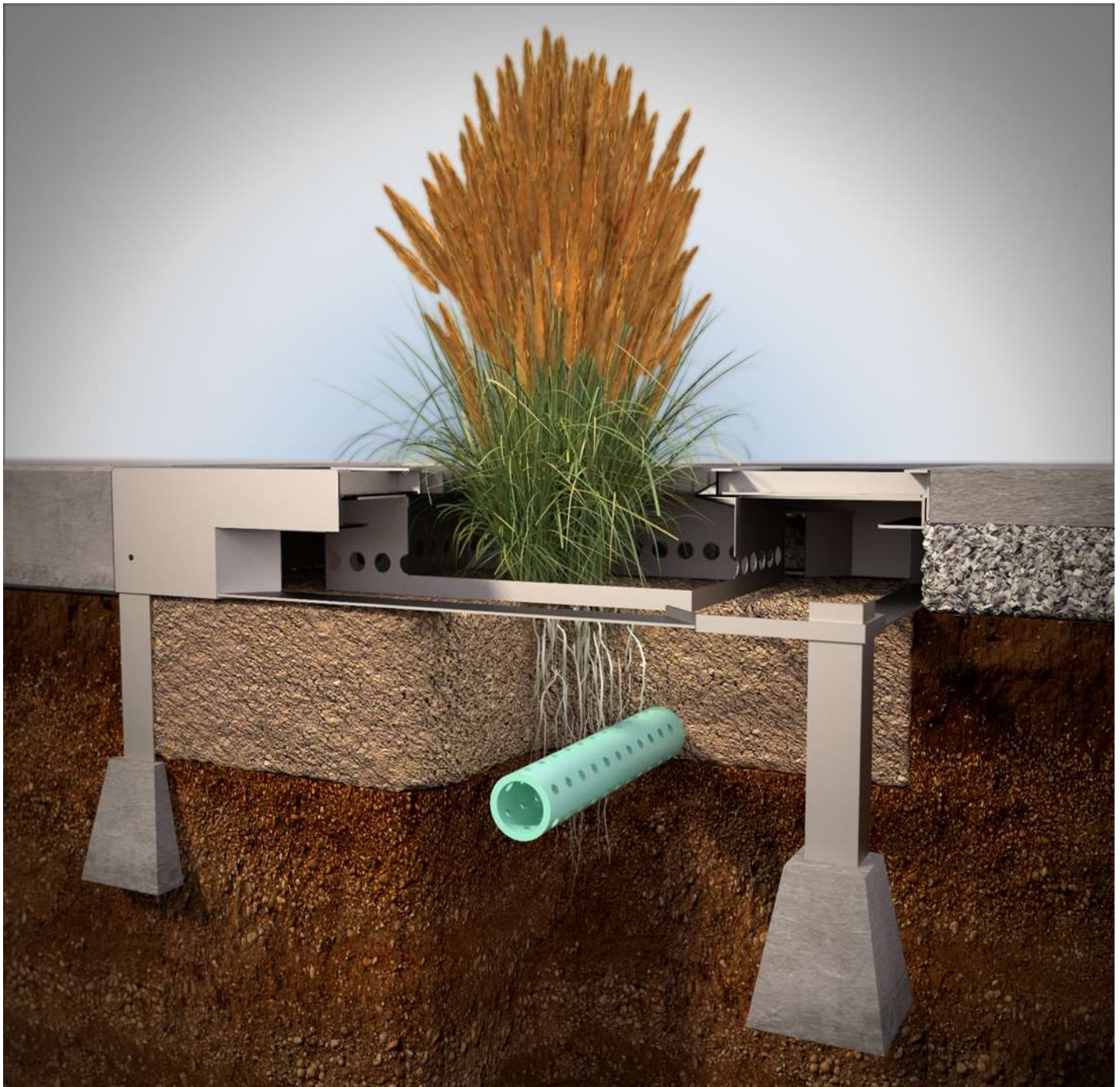
Gabriel Mahon, Chief  
Bureau of Nonpoint Pollution Control

Attachment: Maintenance Plan

cc: Chron File  
Richard Magee, NJCAT  
Vince Mazzei, NJDEP - DLUR  
Jim Murphy, NJDEP - BNPC  
Brian Salvo, NJDEP – BNPC

## TABLE OF CONTENTS

- PRODUCT LITERATURE
- SHOP DRAWINGS
- MATERIALS AND DESIGN SPECIFICATIONS
- INSTALLATION INSTRUCTIONS & MAINTENANCE





# Hydro StormScape™

## Green Infrastructure Filter

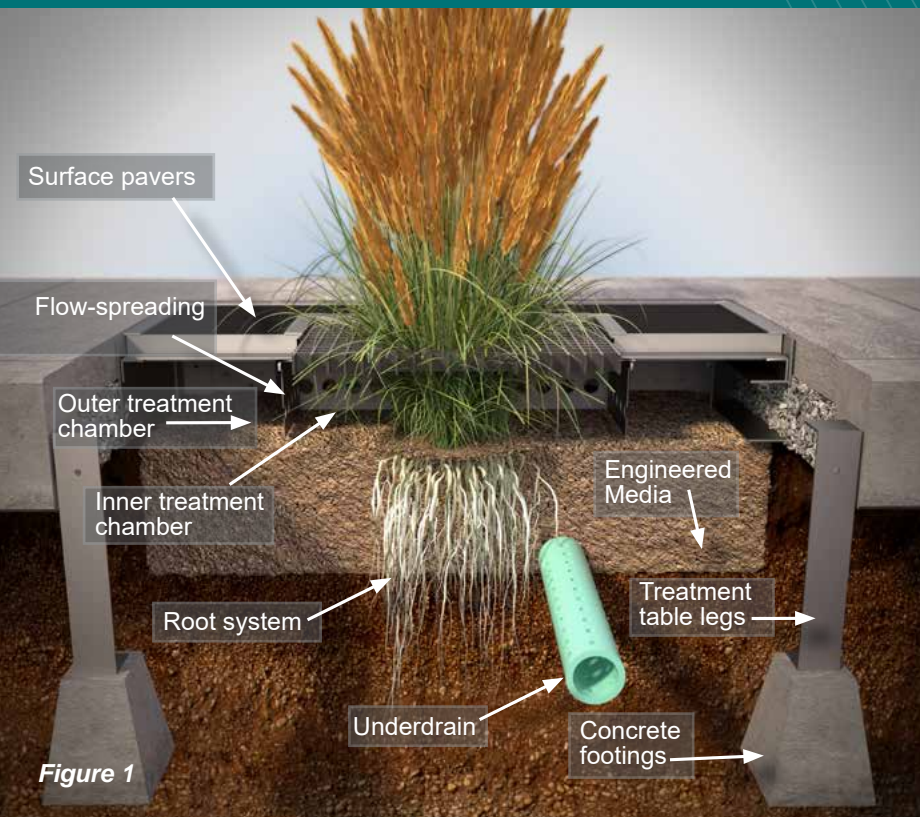


Figure 1

## Benefits

### Flexible Filtration and

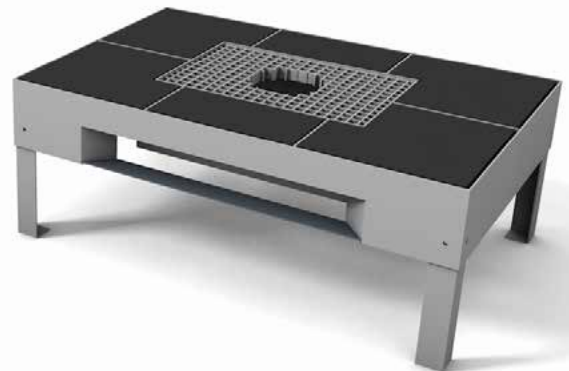
- » An open base won't restrict root growth so vegetation thrives quicker and lives longer
- » Modular design allows you to treat a range of drainage areas
- » installed with only landscape equipment--no crane needed!
- » Flexible design for use in a variety streetscapes and drainage system

## How it Works

1. Flow entering the system is directed around the outer treatment chamber (where trash is captured). Flow passes through an engineered media before
- 2.

## Don't get Boxed in by your BMP!

An open base won't restrict root growth and



## Product Summary

Hydro StormScape™ is a sophisticated departure from traditional BMPs. It's not actually in a box. An open base is not only better for vegetation, it also allows you to keep the system open so it's lightweight and easy to install. This attractive and modular option combines the beauty of smart engineering with common sense and practicality.

## Applications

- » LID or green infrastructure based developments
- » LEED® development projects
- » objective
- » Removal of total suspended solids (TSS),



Stormwater Solutions

→ [hydro-int.com/stormscape](https://hydro-int.com/stormscape)

## Product Versatility

### Modular, Flexible and Easy to Maintain

Hydro StormScape™ Green Infrastructure Filter can adapt to site conditions by working as one, larger system or a series of smaller systems and can be used with a variety of trees, shrubs/hedges,

or message boards.

Surface pavers can be supplied as either

impermeable, and can be easily removed by a professional for quick, simple maintenance.



## Performance Data & Sizing

Model Size <sup>1</sup>		Maximum Drainage Area <sup>2</sup>		Treatment Flow Rate <sup>3</sup>	
(ft)	(m)	(acres)	(sq.m)	(cfs)	(L/s)
4 x 6	1.2 x 1.8	0.147	595	0.078	2.21
6 x 8	1.8 x 2.4	0.293	1186	0.156	4.42
6 x 12	1.8 x 3.6	0.440	1781	0.234	6.63

<sup>1</sup> Standard sizes. Additional custom sizes available.

<sup>2</sup> Based on sediment load of 600 lbs. per acre per year.

<sup>3</sup> Based on loading rate of 1.46 gpm/sf.

System sizing may vary depending on local requirements

Drainage system design should incorporate a peak flow bypass as necessary

Typical Pollutant Removal <sup>4</sup>	
TSS <sup>5</sup>	90%
Phosphorus <sup>6</sup>	50%
Nitrogen	20%
Copper	40%
Zinc	80%

<sup>4</sup>Median removal efficiencies of paired data from over 500 sand filters with similar dimensions. Data submitted by independent researchers to International BMP Database. Retrieved from <http://www.bmpdatabase.org> on October 23, 2017

<sup>5</sup>New Jersey Corporation for Advanced Technology (NJCAT) data

<sup>6</sup>Phosphorus Removal estimate does not include results from compost filters



📍 Hydro International, 94 Hutchins Drive, Portland, ME 04102

☎ Tel: (207) 756-6200

✉ Email: [stormwaterinquiry@hydro-int.com](mailto:stormwaterinquiry@hydro-int.com)

🌐 Web: [www.hydro-int.com/stormscape](http://www.hydro-int.com/stormscape)

Version SS\_SS\_0620(2)

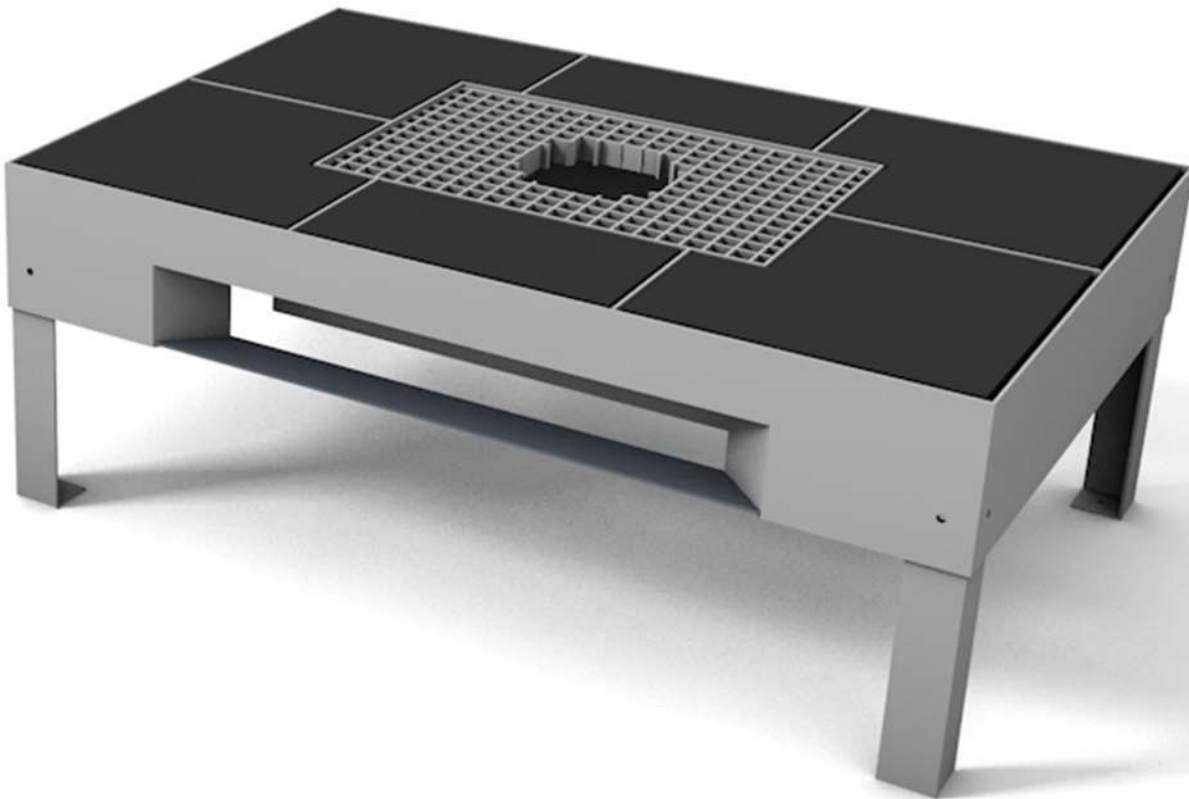
### Download Drawings!

→ [hydro-int.com/stormscapedrawings](http://hydro-int.com/stormscapedrawings)

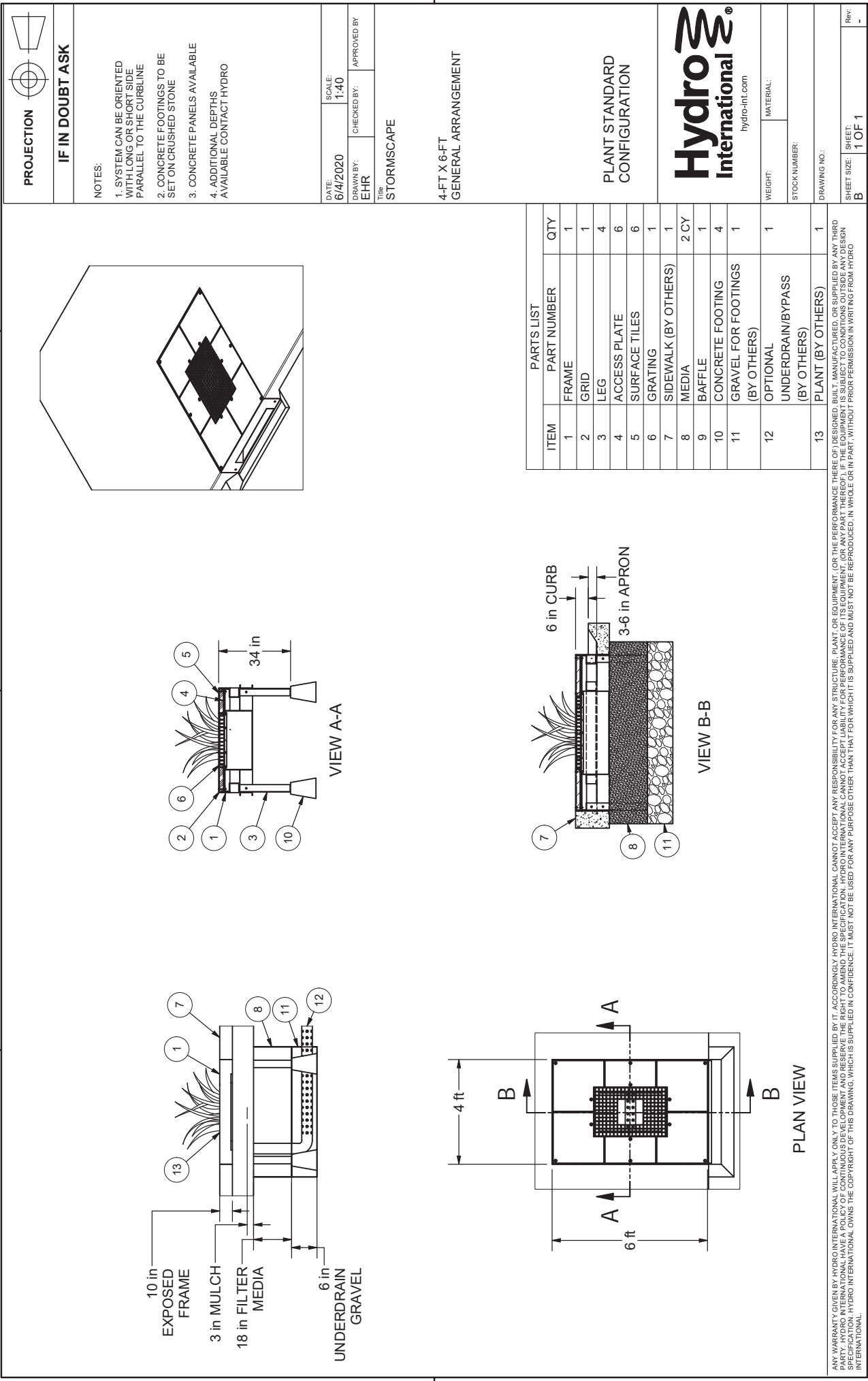
### Access the Operation & Maintenance Manual

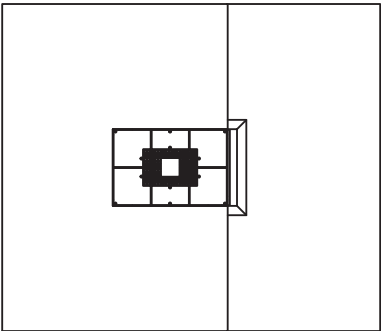
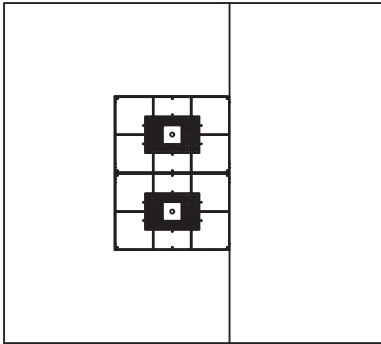
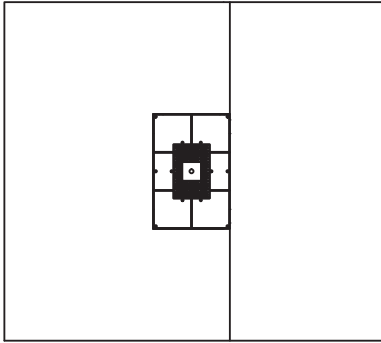
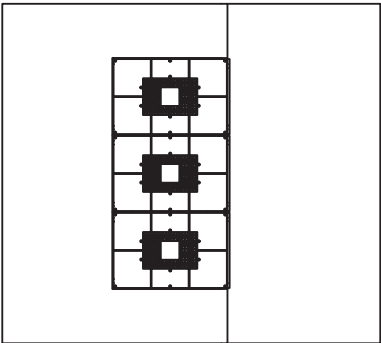
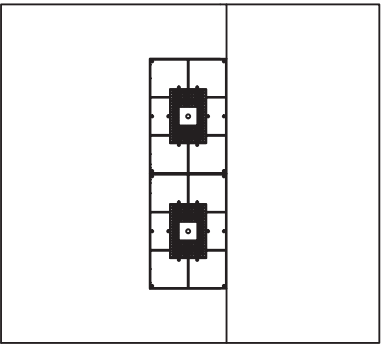
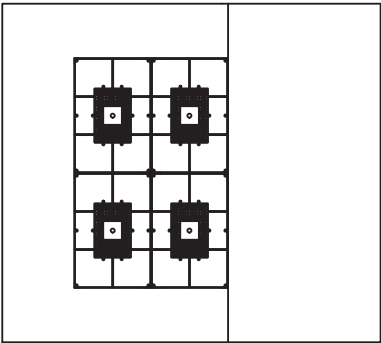

→ [hydro-int.com/stormscapeOM](http://hydro-int.com/stormscapeOM)

## Shop Drawings

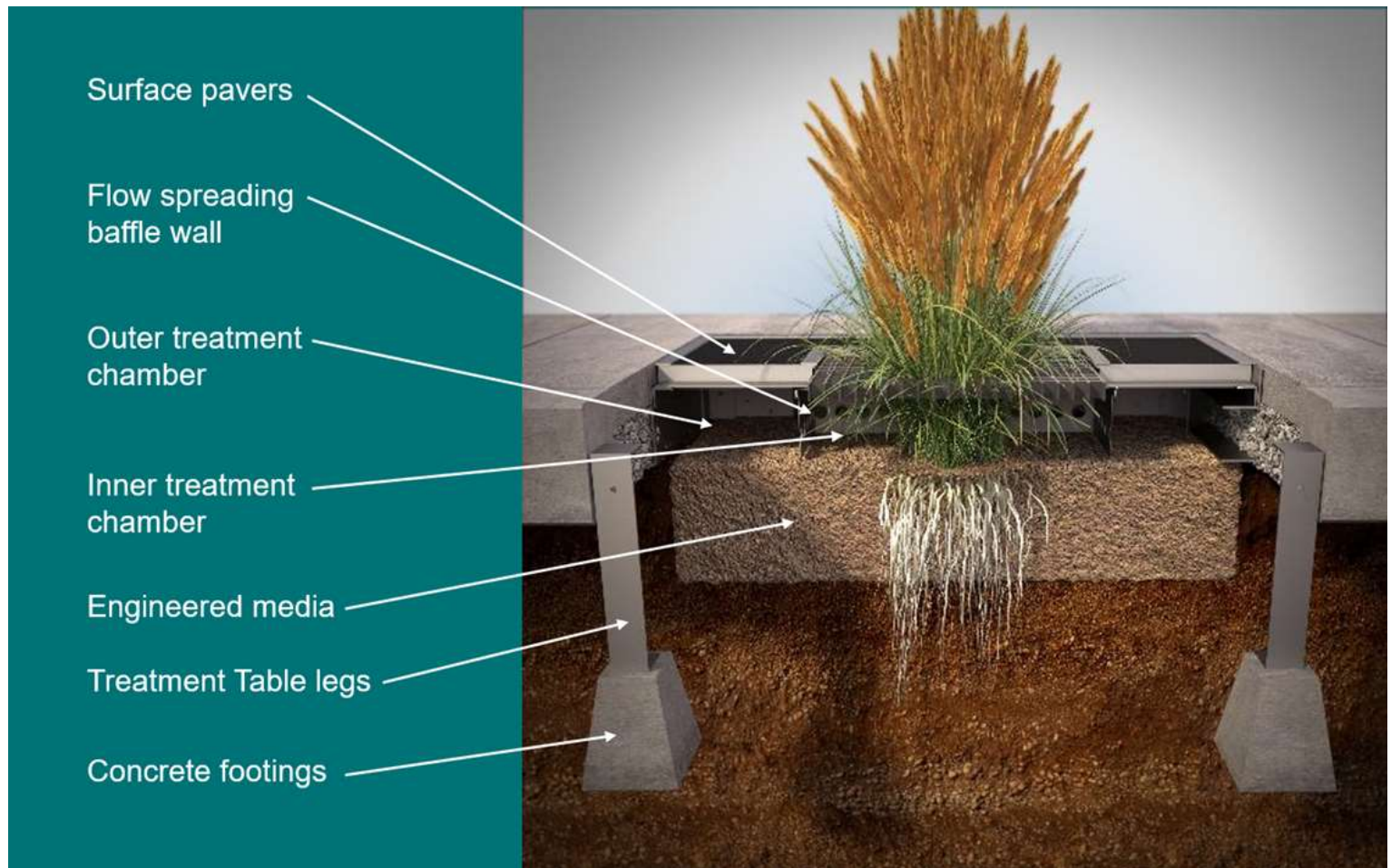






4' x 6'		8' x 6'		6' x 4'	
					
12' x 6'		12' x 4'		12' x 8'	
					
<div>PROJECTION</div> <div>IF IN DOUBT ASK</div> <div>NOTES: 1. CONCRETE FOOTINGS TO BE SET ON CRUSHED STONE. 2. BYPASS/UNDER DRAIN PIPE TO BE SIZED BY ENGINEER. 3. UNITS ARE MODULAR AND CAN BE COMBINED FOR LARGER FOOTPRINT</div> <div><div><div>DATE: 6/5/2020</div><div>DRAWN BY: EHR</div></div><div><div>SCALE: 1 / 80</div><div>CHECKED BY:</div></div><div>APPROVED BY:</div></div> <div><div>Title STORMSCAPE</div><div>GENERAL ARRANGEMENT</div></div> <div><div><div>Hydro<sup>®</sup> International</div><div>hydro-int.com</div></div><div><div>WEIGHT:</div><div>MATERIAL:</div></div><div>STOCK NUMBER:</div></div> <div><div>DRAWING NO.:</div><div>SHEET SIZE: B</div><div>SHEET: 1 OF 1</div><div>Rev: -</div></div>					
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## Material & Design Specifications



StormScape™ Materials and Design

- A. Soil Media Mixture shall meet the following requirements:
  - 1. Sand media mixture shall be capable of an infiltration rate of at least 100" per hour.
  - 2. Media blend based on the ASTM C33 sand filter gradation with a max size of 4750 microns, minimum size of 150 microns, and 40% open void space.
  - 3. Media shall have organic content in the form of peat.
- B. Frame, Grid, and Legs shall be grade 304 stainless steel in accordance with ASTM A314.
- C. Access Plates below the surface pavers shall be 6061-T6 aluminum.
- D. Surface tiles are precast concrete, 2<sup>3</sup>/<sub>8</sub>" thick, per enclosed data sheet. Other paver material options available. Standard color is Natural. Other colors available are Granite Blend or Meadow.
- E. Standard tree grate is fiberglass grating per enclosed data sheet. Other grate options available.

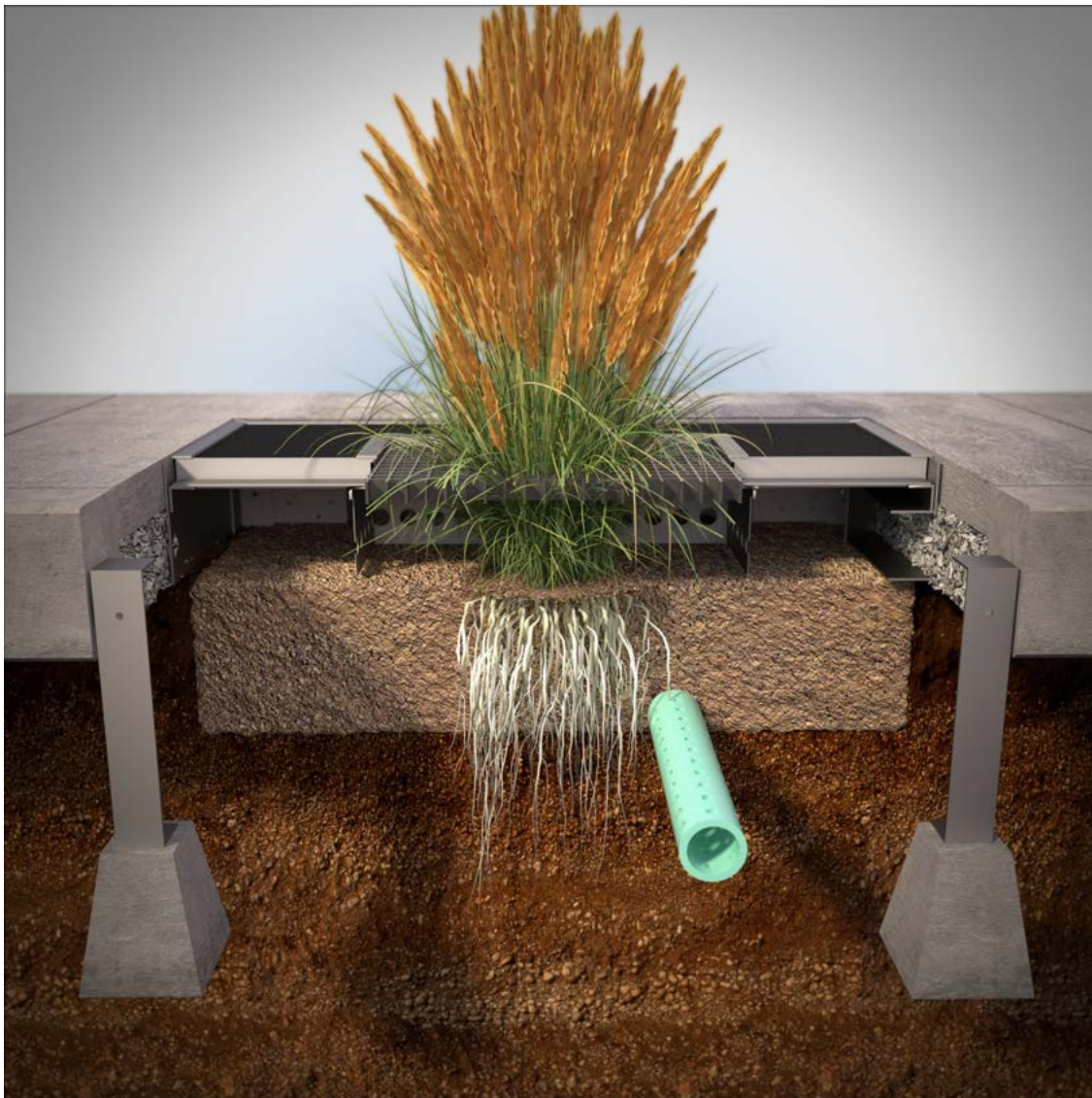


## Installation Instructions & Maintenance



# StormScape™

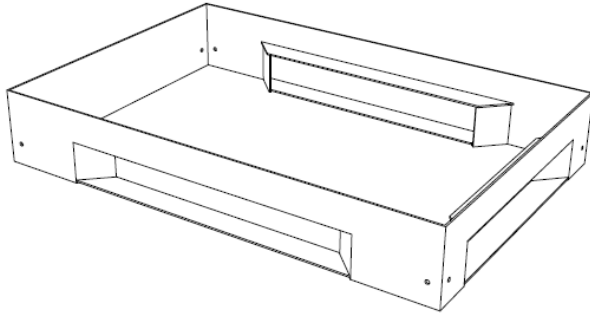
## Assembly and Maintenance



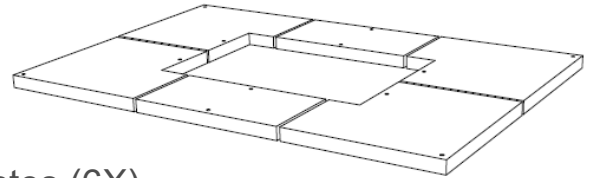


## Materials Supplied By Hydro International

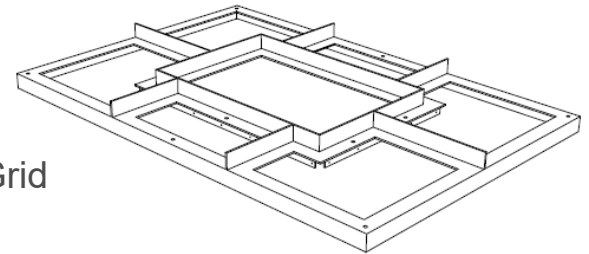
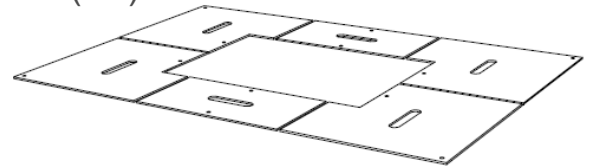
Frame



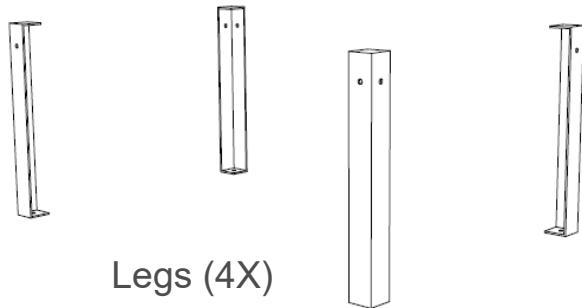
Tiles and bolts (6X)



Plates (6X)

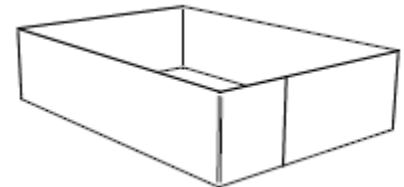


Grid

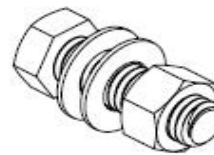


Legs (4X)

Perforated  
Baffle



- 1/2-inch Leg-to-Frame Bolt Set (4X)



- Filter Media (2 Tons)

## **Materials Supplied By Contractor**

- Perforated underdrain pipe as shown in General Arrangement Drawing
- Concrete post supports (i.e. precast block or Sonotube)
- Anchors to attach to post supports (i.e. wedge anchors or cast-in anchors)
- Shrub or small tree to meet local climate conditions

## **Handling and Storage**

Hydro International's **StormScape** components are manufactured utilizing highly durable architectural grade components; however, improper handling can result in damage. Failure to comply with handling, storage, and assembly instructions voids all warranties.

1. Upon delivery of the **StormScape** components, inspect immediately for defects or shipping damage. If any discrepancies or missing components are identified, notify Hydro International prior to unloading to initiate corrective action.
2. At all times, avoid unnecessary and extreme impacts to the internal components. At no time shall anyone step, stand, or otherwise place an unnecessary load, on the components.
3. The **StormScape** shall be, as far as practical, assembled and installed as soon after delivery as possible.

## **Required Tools and Equipment**

- Measuring Tape
- Socket Wrench and Set
- Box Wrench and Set
- Hex Key Set
- Wood Blocking
- Hammer Drill with 1/2 in. Masonry Bit
- Production Detail Drawings



## Assembly



- Excavate a rectangular hole 5 x 7 feet by 3 feet deep.



## Assembly



- Install **Post Supports** on gravel base.
- Bolt **Legs** to **Feet** with provided anchor bolts.

## Assembly



- Bolt **Frame** to **Legs** with provided bolts.



## Assembly



- Place **Grid** in **Frame** and square the frame to fit.
- Install perforated pipe and riser as shown in General Arrangement drawing (not shown).
- Backfill gravel to within two feet of grade (not shown).



## Assembly



- Backfill the excavation to grade with provided media and rake level.

## Assembly



- Install **Baffle** to **Grid** (not shown).
- Install **Plates** and **Tiles** with supplied bolts.
- Plant tree root ball in supplied media.
- Install **Grating** around tree trunk.



## Assembly



- Smoothly grout apron to direct runoff to throat of unit.

## Maintenance



- The StormScape collects trash and leaves in the perimeter of the unit
- To maintain the system, the tiles can be removed for easy access.



## Maintenance



- View of throat of the StormScape clogged with leaves and debris



## Maintenance



- Remove **Grating** from around the tree trunk.



## Maintenance



- Remove security bolts from the **Tiles** with hex wrench



## Maintenance



- Remove **Tiles** from surface of StormScape

## Maintenance



- View of the **Tile** being removed from the StormScape



## Maintenance



- Remove **Plate** from StormScape



## Maintenance



- View of leaves and debris within StormScape

## Maintenance



- View of StormScape with all **Tiles** removed



## Maintenance



- Remove leaves, trash and debris by hand or with a small rake.
- Remove and replace top layer of media if necessary.
- Replace plates, tiles and security screws.